ONTARIO MINISTRY OF ENVIRONMENT
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OPERATING SUMMARY

BRANTFORD

water pollution control plant

1968

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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

D Caverly

D. S. Caverly,
General Manager.

DMcTavish

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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BRANTFORD
water pollution control plant

operated for

THE CITY OF BRANTFORD

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

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FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

A total of 2,641.5 million gallons of raw sewage was treated in 1968, representing an increase of 0.7 percent over 1967 flows. The average daily flow for the year was 7.22 million gallons. Plant efficiency averaged 89 percent organic removal based on BOD analysis and 95 percent suspended solids removal.

The total operating costs for 1968 were $251,764.34 or $95.31 per million gallons, as opposed to $226,643.20 in 1967. The increased costs could not be attributed specifically to one category but were spread more or less evenly among all areas. However, the largest increases fell under the Power and Sundry columns, reflecting a tax increase.

The total plant staff was reduced to 19 by the sudden death of S. Nettleton. This position was not filled by the end of 1968.

Discussions were held late in the year with municipal representatives regarding the possibility of using city-owned farmland as a liquid sludge disposal site. Due to the cost-saving nature of the proposal, sufficient interest was generated to warrant further investigation in 1969.

The report on aeration equipment modifications by Proctor and Redfern, consulting engineers, was reviewed, and preliminary discussions were held with municipal officials. A definite course of action will be determined early in 1969.

In general, the Brantford plant was well maintained and operated during the past year and staff are to be commended for their efforts in this regard.

PROJECT COSTS

NET CAPITAL COST (Final)	$2,250,950.02
DEDUCT - Payments from Municipalities	493,126.02
Long Term Debt to OWRC	$1,757,824.00

Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 465,755.32

Net Operating	$ 251,764.34
Debt Retirement	46,653.00
Reserve	10,427.07
Interest Charged	98,690.23
TOTAL	$ 407,534.64

RESERVE ACCOUNT

Balance at January 1, 1968	$ 79,562.16
Deposited by Municipality	10,427.07
Interest Earned	4,934.99
	$ 94,924.22
Less Expenditures	-
Balance at December 31, 1968	$ 94,924.22

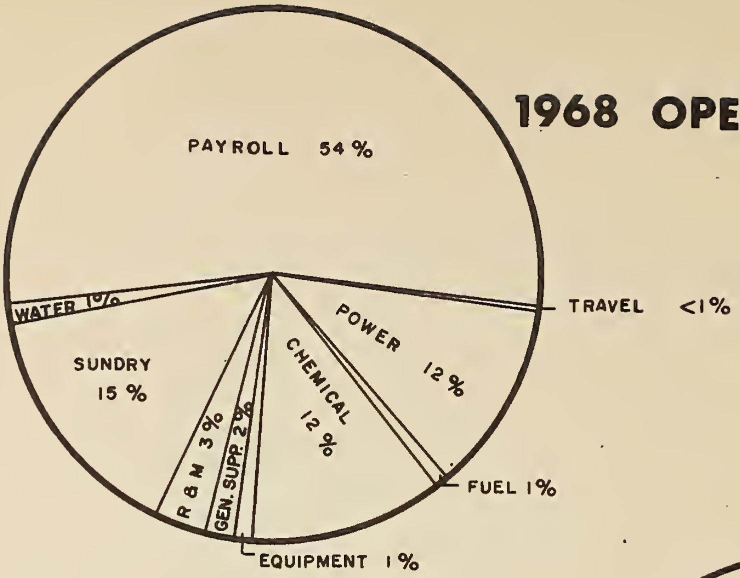
Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAY ROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	13947.91	9112.30	-	-	2390.60	731.88	376.37	293.61	366.45	61.85	614.25	-
FEB	15264.51	9149.78	-	556.37	2247.80	1951.68	223.50	392.00	182.71	560.67	-	-
MAR	21657.93	14713.28	-	79.97	2345.00	2786.50	175.87		535.77	913.09	108.43	-
APRIL	41271.66	9122.58	-	839.07	2256.20	2554.77	136.96	1164.37	367.00	24830.71	-	-
MAY	17721.89	9081.49	58.22	-	2261.60	4643.40	345.82	200.00	468.53	662.83	-	-
JUNE	13365.74	9192.37	454.82	61.84	2406.81	1707.72	256.17	(1518.64)	193.58	611.07	-	-
JULY	16069.90	9483.12	843.74	-	1926.18	2056.31	629.03	2.92	320.17	808.43	-	-
AUG	19121.40	13926.45	1531.52	40.70	-	1715.72	358.52	94.37	735.41	578.09	-	140.26
SEPT	11727.22	8311.23	634.60	-	-	737.88	413.96	245.86	761.42	622.27	-	-
OCT	22176.74	8235.71	419.31	59.90	6465.60	1726.34	196.15		1327.21	2029.61	1716.91	-
NOV	19161.18	8601.38	98.90	-	2434.41	2940.34	345.27	910.24	989.64	2626.34	148.14	66.52
DEC	40278.26	21881.02	-	703.24	4924.10	5595.33	1201.09	1323.93	1371.29	3126.91	-	151.35
TOTAL	251764.34	130810.71	4041.11	2341.09	29658.30	29147.87	4658.73	3109.02	7619.18	37431.87	2588.33	358.13

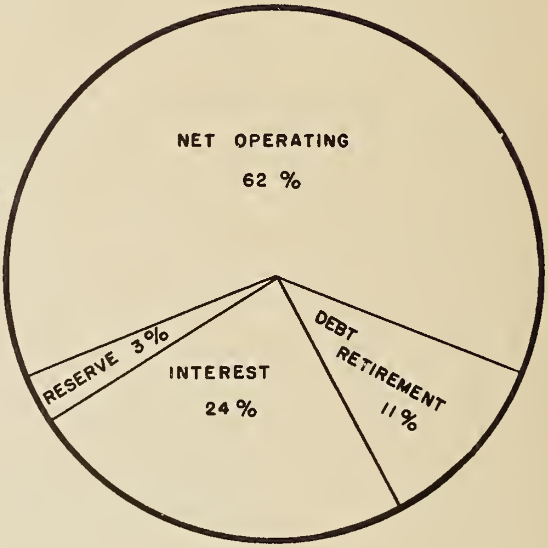
*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $5,454.13

BRACKETS INDICATE CREDIT

1968 OPERATING COSTS



TOTAL ANNUAL COST

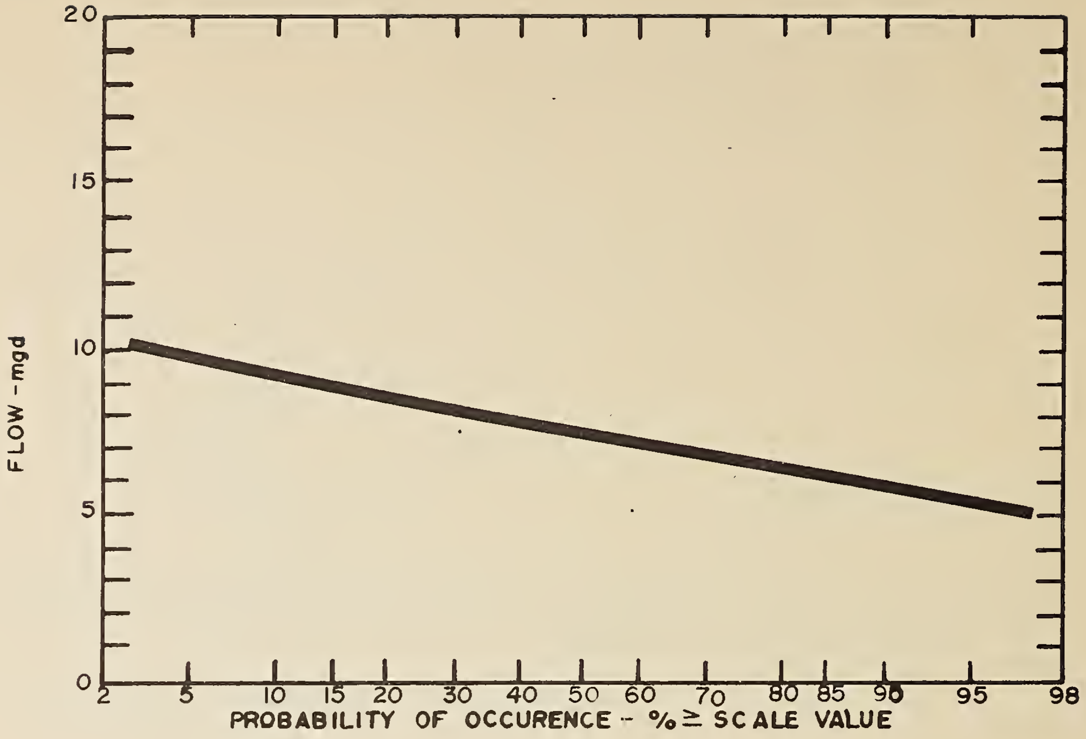


Yearly Operating Costs

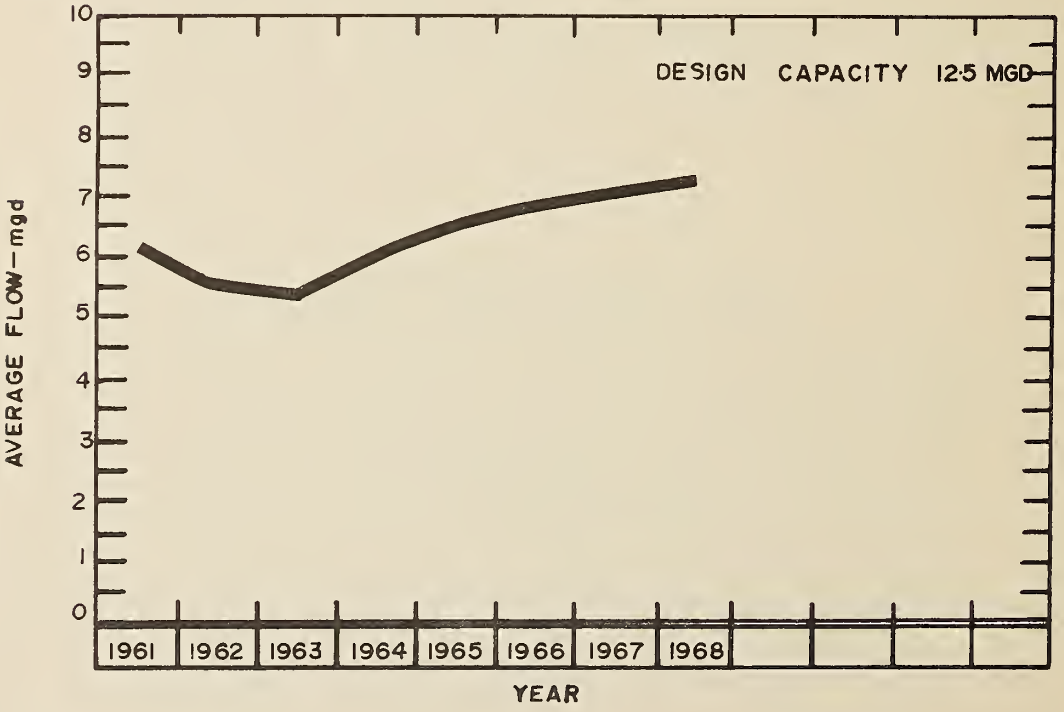
YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	2221	$171,859.76	$77.39	6 cents
1965	2395	185,704.83	77.53	6 cents
1966	2490	188,867.51	75.83	4 cents
1967	2622	226,643.20	86.44	4 cents
1968	2642	251,764.34	95.31	5 cents

Process Data

The following graphs and charts give detailed information on flows, organic loading, efficiency of treatment, vacuum filter and digester operation and chlorination requirements.


FLOW - mgd
0
5
10
15
20
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

FLOWS

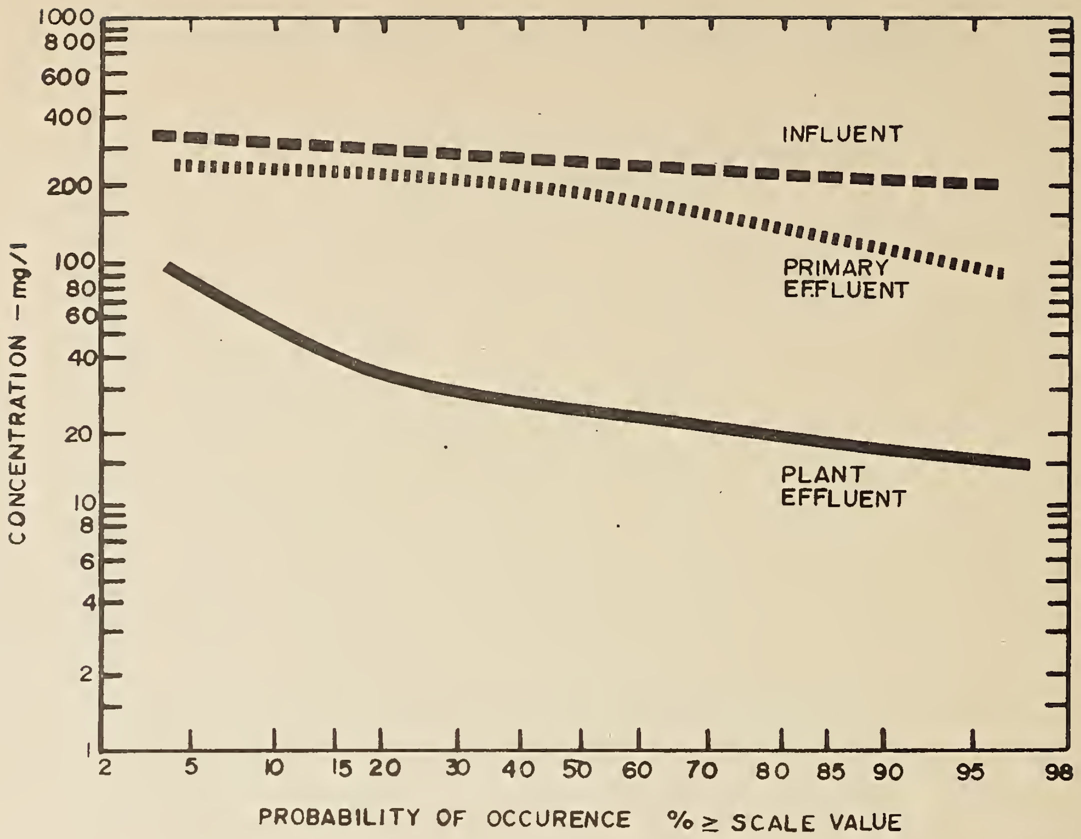

AVERAGE FLOW - mgd
DESIGN CAPACITY 12·5 MGD
0
1
2
3
4
5
6
7
8
9
10
1961
1962
1963
1964
1965
1966
1967
1968
YEAR

PLANT FLOWS and CHLORINATION

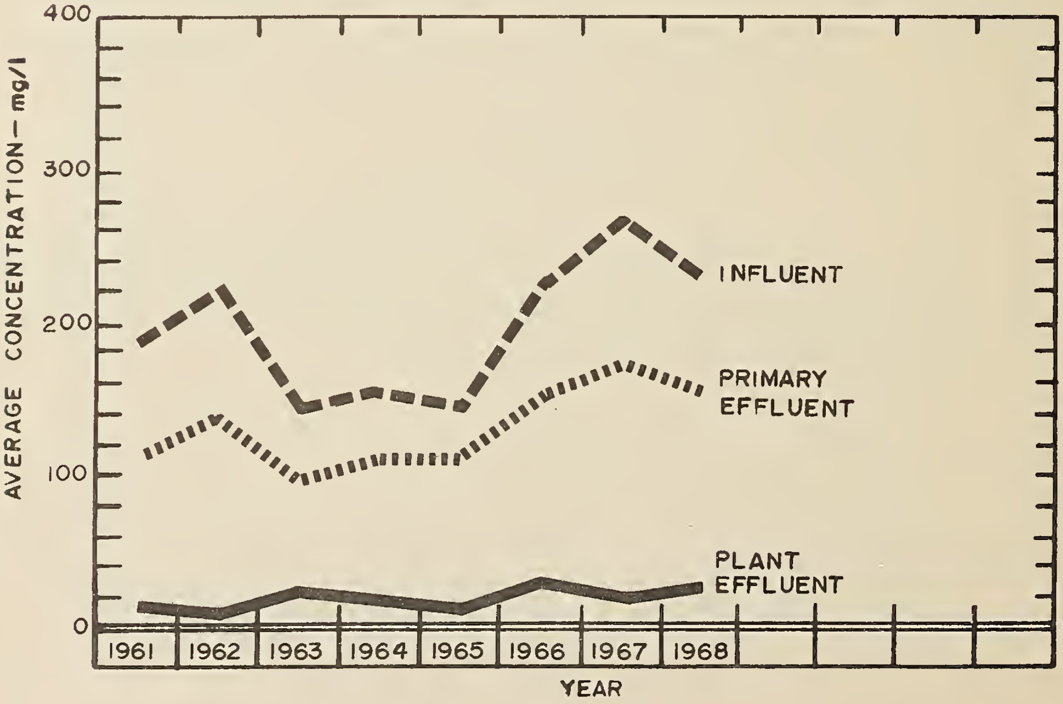
MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10^3 lbs.	DOSAGE mg/l
JAN	231. 6	7. 47	9. 85	5. 06	5. 84	2. 5
FEB	257. 8	8. 89	12. 85	6. 04	5. 01	1. 9
MAR	229. 5	7. 40	9. 12	5. 07	5. 46	2. 4
APR	216. 1	7. 20	9. 33	4. 95	5. 41	2. 5
MAY	206. 6	6. 66	8. 18	4. 96	4. 25	2. 4
JUN	207. 5	6. 92	9. 97	4. 64	5. 48	2. 6
JUL	209. 7	6. 76	8. 16	3. 97	4. 34	2. 7
AUG	211. 1	6. 81	8. 07	4. 53	4. 60	2. 2
SEPT	226. 5	7. 55	9. 15	4. 76	5. 65	2. 5
OCT	211. 7	6. 83	8. 30	4. 60	6. 36	3. 0
NOV	204. 3	6. 81	10. 20	4. 60	6. 90	3. 4
DEC	229. 1	7. 39	9. 00	4. 40	8. 21	3. 6
TOTAL	2641. 5	-	-	-	67. 51	-
AVERAGE	-	7. 22	-	-	5. 62	2. 6

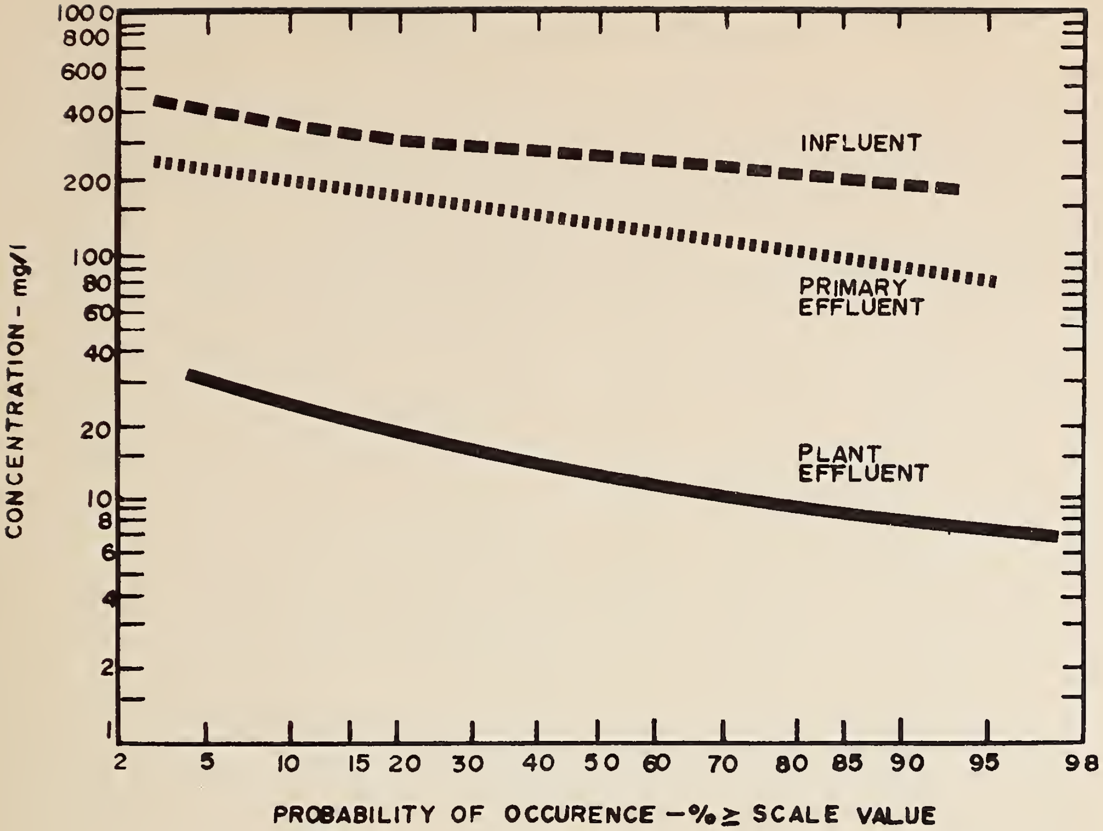
COMMENTS

A total of 2, 641. 5 million gallons of raw sewage was treated during the year for an average daily flow of 7. 22 million gallons. The maximum flow for one month of 257. 8 million gallons occurred in February as did the maximum daily flow of 12. 85 million gallons.

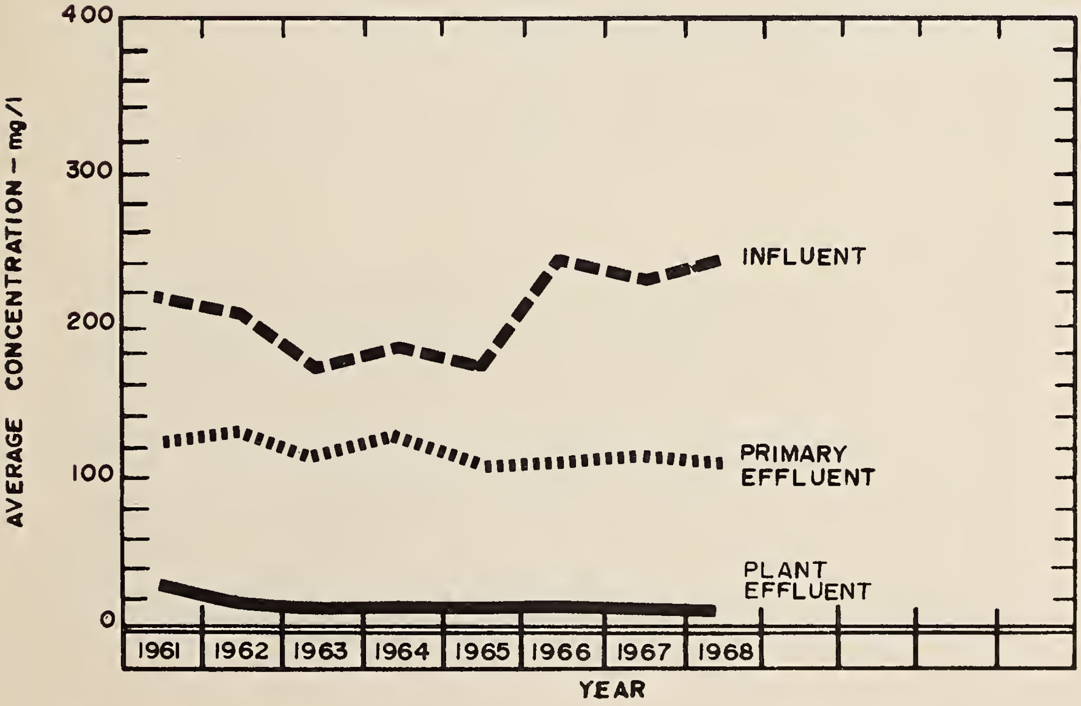


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC^{N} mg/l	EFF CONC^{N} mg/l	RED^{N} %	REMOVAL 10^5 lb	INF CONC^{N} mg/l	EFF CONC^{N} mg/l	RED^{N} %	REMOVAL 10^5 lb	REMOVAL ft^3
JAN	229	29	87	4.63	227	15	93	4.92	833
FEB	270	35	87	6.06	270	15	94	6.57	743
MAR	237	40	83	4.52	267	21	92	5.66	1177
APR	236	23	90	4.61	212	8	98	4.40	772
MAY	240	21	91	4.53	252	8	97	5.04	661
JUN	244	16	94	4.74	200	6	97	4.02	27
JULY	197	17	91	3.78	183	6	97	370	921
AUG	191	24	87	3.52	234	14	94	4.64	838
SEPT	196	51	74	3.28	277	7	97	6.11	882
OCT	252	14	94	5.03	291	11	96	5.93	571
NOV	216	16	92	4.08	282	16	94	5.43	693
DEC	259	27	90	5.32	207	14	93	1.58	541
TOTAL	-	-	-	54.10	-	-	-	58.00	9459
AVERAGE	230	26	89	4.51	242	12	95	4.83	788

COMMENTS

The raw sewage strength in 1968 was organically weaker than 1967, averaging 230 mg/l BOD as opposed to 263 mg/l. The design value for the plant was 170 mg/l BOD. Organically, therefore, a heavier load is being treated than that for which the design was intended at a given flow. The effluent quality deteriorated from an average BOD concentration of 20.2 mg/l in 1967 to 26 mg/l in 1968, both values being in excess of the OWRC objective of 15 mg/l.

The suspended solids concentration in the raw sewage was higher at 242 mg/l as opposed to 233 mg/l in 1967. Effluent suspended solids averaged 12 mg/l in 1968, which is within the OWRC objective of 15 mg/l.

AERATION

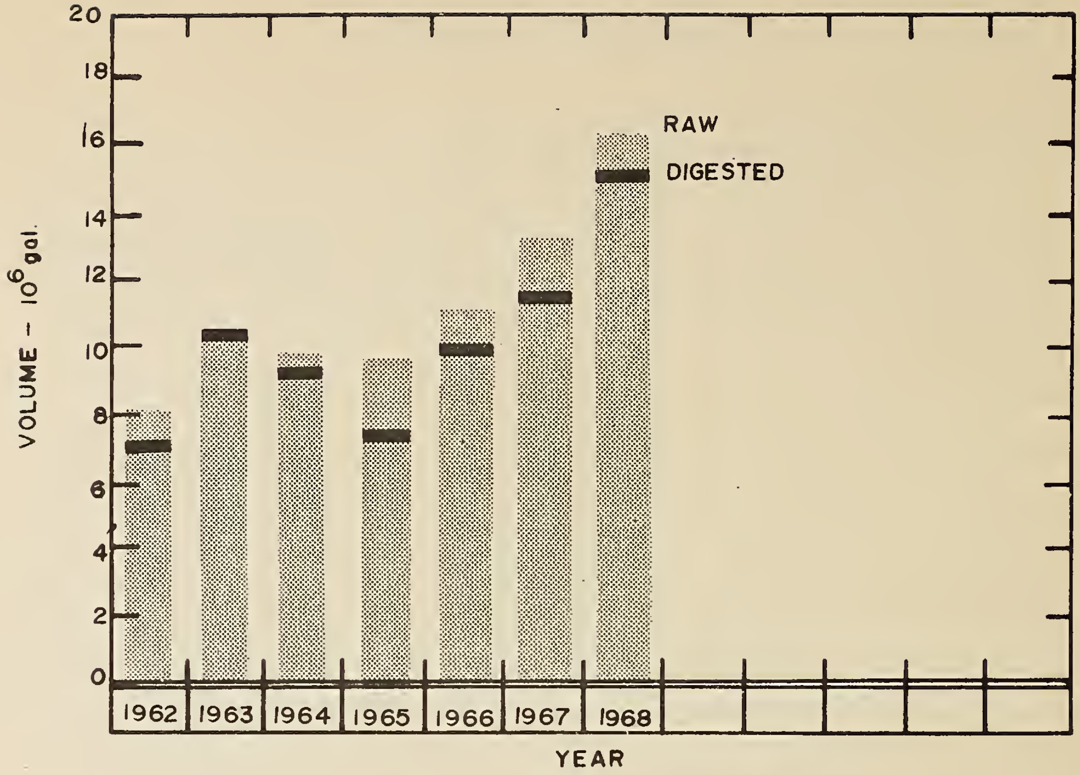
MONTH	AVERAGE FLOW mgd	PRIMARY EFF		SECONDARY EFF		ML SS CONC^N mg/l	F/M $\left(\frac{\text{lb BOD}}{\text{lb MLSS}}\right)$	AIR USED $\left(\frac{\text{1000 ft}}{\text{lb BOD}}\right)$ REMOVED	WASTE SLUDGE 10^5 lb
		BOD CONC^N mg/l	SS CONC^N mg/l	BOD CONC^N mg/l	SS CONC^N mg/l				
JAN	7.47	166	118	29	15	3,140	0.09	1.21	-
FEB	8.89	156	100	35	15	3,000	0.14	1.04	-
MAR	7.40	172	149	40	21	2,700	0.12	1.22	
APRIL	7.20	157	114	23	8	2,050	0.17	1.22	-
MAY	6.66	148	104	21	8	2,650	0.11	1.40	-
JUN	6.92	148	105	16	6	2,100	0.15	1.28	-
JUL	6.76	114	95	17	6	1,940	0.12	1.78	-
AUG	6.81	89	105	24	14	2,010	0.09	2.64	-
SEPT	7.55	89	116	51	7	2,460	0.08	3.98	-
OCT	6.83	243	99	14	11	2,670	0.19	.75	3.64
NOV	6.81	200	153	16	16	3,380	0.12	.94	3.26
DEC	7.39	181	100	27	14	2,730	0.15	1.00	3.50
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	7.22	155	113	26	12	2,570	0.13	1.54	*3.46

* Three months' data

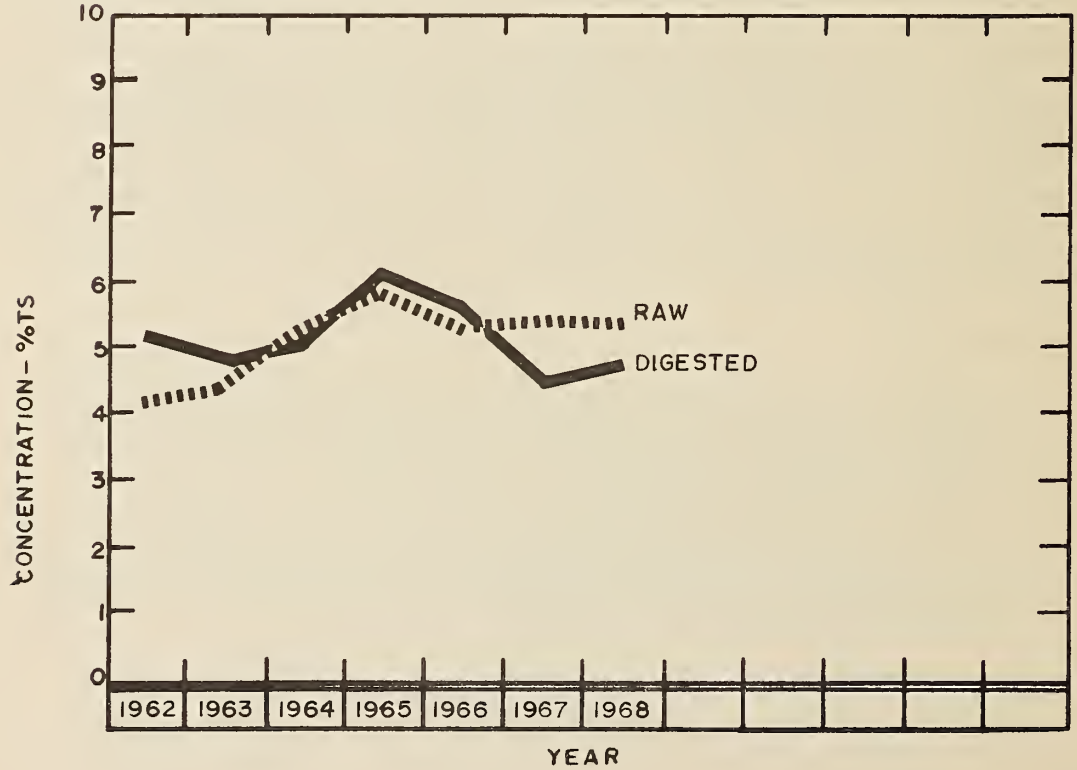
COMMENTS

Removal efficiencies in the primary section of the plant were 33% for BOD and 53% for suspended solids. The mixed liquor suspended solids averaged 2570. The aeration tank loading averaged 13 lbs. per 100 lbs. of MLSS as opposed to 16 lbs. in 1967.

Dissolved oxygen levels again dropped to unacceptable levels during warm weather. Recommendations by Proctor and Redfern regarding aeration modifications will eliminate this problem.


VOLUME - 10^6 gal.
20
18
16
14
12
10
8
6
4
2
0
RAW
DIGESTED
1962
1963
1964
1965
1966
1967
1968
YEAR

DIGESTION


CONCENTRATION - %TS
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1962
1963
1964
1965
1966
1967
1968
YEAR

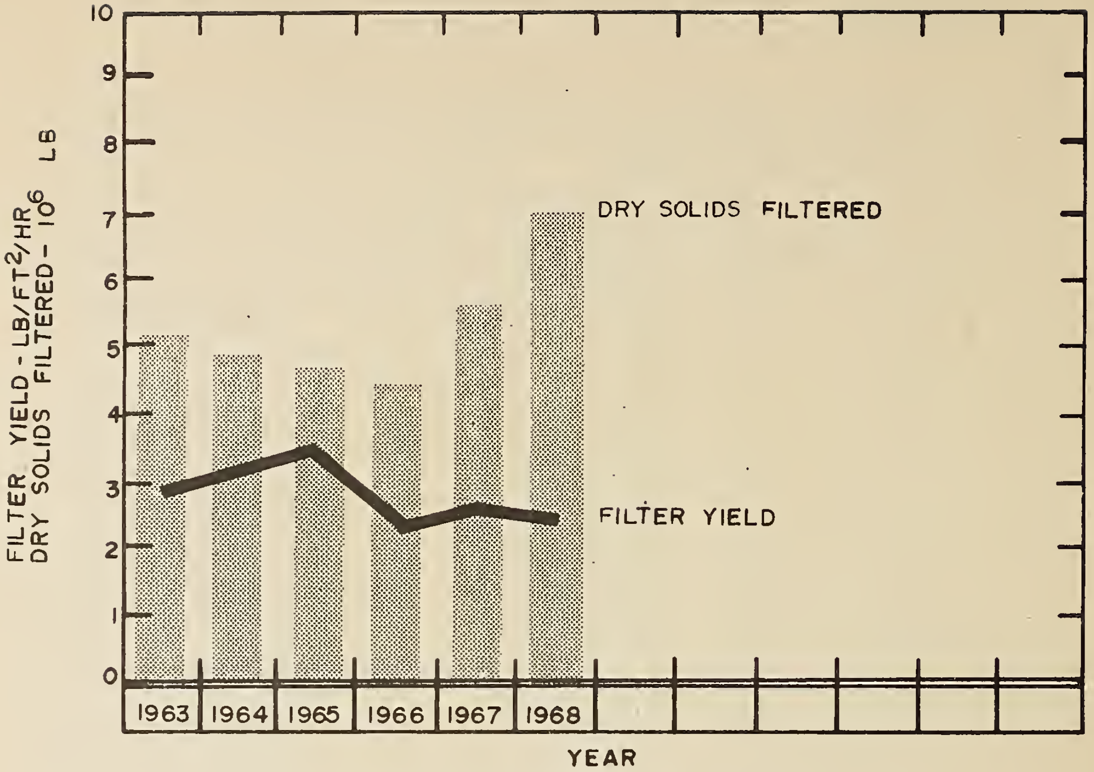
SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^6 gal	T.S. %	V.S. %	VOLUME 10^6 gal	T.S. %	V.S. %	VOLUME 10^4 gal	T.S. %	LIQUID yd^3	DEWATERED yd^3
JAN	1.52	5.3	63	1.44	4.3	57	4.14	-	0	1176
FEB	1.42	6.4	62	1.34	4.9	52	0	-	0	1542
MAR	1.20	6.2	67	1.31	5.7	54	0.01	-	0	1410
APR	1.21	6.4	65	1.21	5.7	53	3.38	-	0	1332
MAY	1.32	5.4	68	1.45	5.0	58	0	-	0	2112
JUN	1.38	5.1	65	1.36	4.3	56	0	-	0	1572
JUL	1.31	5.1	67	0.81	4.1	57	6.48	-	0	846
AUG	1.21	5.3	60	0.96	4.2	56	7.92	-	0	1098
SEPT	1.45	5.0	61	1.09	4.7	54	5.82	-	0	1188
OCT	1.42	4.6	62	1.39	4.7	54	7.37	-	0	1380
NOV	1.39	4.6	62	1.31	4.5	53	4.34	-	0	1446
DEC	1.60	5.0	63	1.47	4.8	54	6.61	0.2	0	1566
TOTAL	16.43	-	-	15.14	-	-	46.07	-	0	16668
AVERAGE	1.37	5.4	64	1.26	4.8	5.5	3.85	0.2	0	1389

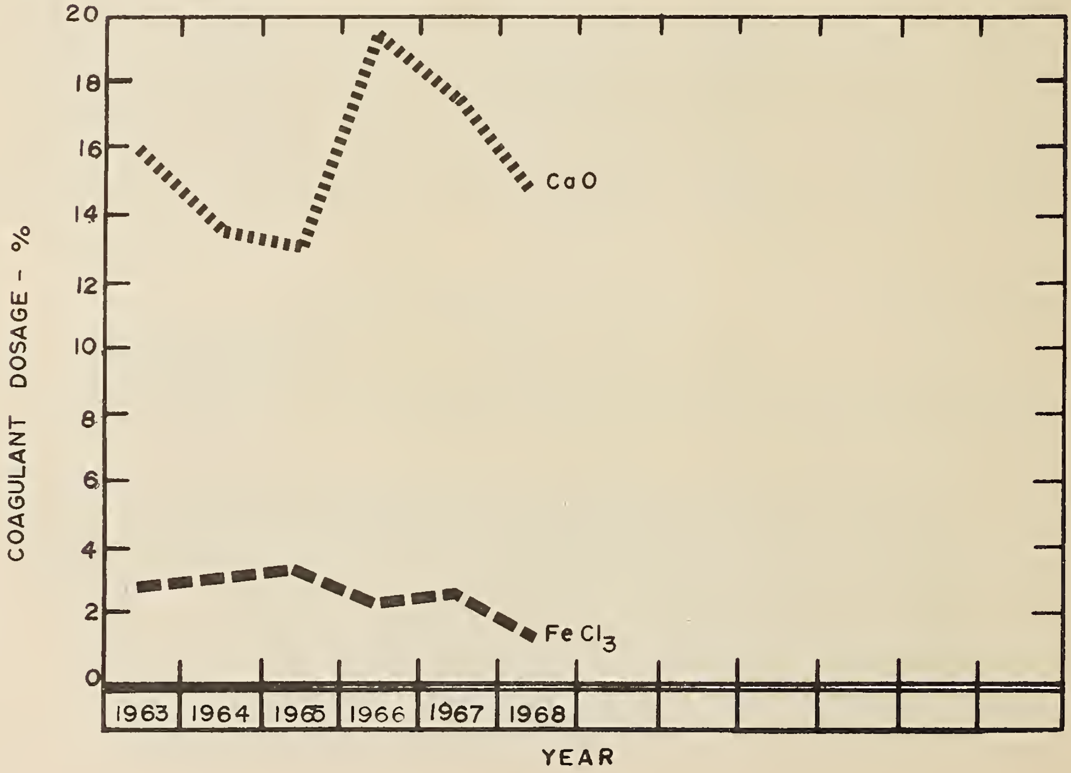
COMMENTS

A total of 16,430,000 gallons of raw sludge was pumped to the primary digesters, an increase of 20% over 1967. The average solids content of 5.4% was similar to that of 1967.

One secondary digester was dewatered, inspected and repairs and modifications made to the supernatant withdrawal mechanism. The digester cover and internal structure were in excellent condition and maintenance was not considered necessary at that time. The second secondary digester will similarly be inspected in 1969.



VACUUM FILTRATION



VACUUM FILTRATION

MONTH	TOTAL FILTER USE hr	SLUDGE TO FILTER		CONDITIONING CHEMICALS						FILT. CAKE	* FILTR	YIELD lb/ft^2
		CONC	DRY SOLIDS	CaO		$FeCl_3$		POLYMER				
		T S. %	10^5 lb	10^3 lb	%	10^2 lb	%	lb	ppm	T.S %	T.S. %	hr
JAN	715	4.3	6.16	94	15.2	73	1.2	0	-	18	2.0	2.4
FEB	776	4.9	7.22	101	14.0	107	1.5	0	-	20	1.8	2.7
MAR	732	4.8	6.51	93	14.3	104	1.6	0	-	20	2.1	2.5
APR	672	5.0	5.98	90	15.0	88	1.5	0	-	19	2.5	2.5
MAY	844	5.1	7.31	109	14.9	111	1.5	0	-	19	1.9	2.5
JUN	764	4.3	5.73	99	17.3	102	1.8	0	-	18	2.2	2.2
JUL	433	4.1	3.31	56	16.9	50	1.5	0	-	17	1.6	2.2
AUG	474	4.3	4.17	61	14.6	46	1.1	0	-	17	1.3	2.5
SEP	541	4.7	5.10	68	13.3	44	0.9	0	-	18	1.4	2.7
OCT	637	4.6	6.48	83	12.9	50	0.8	0	-	17	1.8	2.8
NOV	632	4.4	5.77	83	14.3	44	0.8	0	-	19	2.1	2.6
DEC	743	4.7	6.97	94	13.5	60	0.9	0	-	19	1.7	2.7
TOTAL	7963	-	70.69	1031	-	879	-	0	-	-	-	-
AVERAGE	664	4.6	5.89	86	14.7	73	1.3	0	-	18	1.9	2.5

* FILTR. DENOTES FILTRATE PLUS WASH WATER

COMMENTS

The filters were operated for a total of 7,963 hours as opposed to 6,296.75 hours in 1967. There was a 24% increase in dry solids filtered over 1966 and the average yield of 2.5 pounds per square foot of filter area per hour was comparable to 1966 yields. Filtrate solids of 1.9% are in excess of acceptable levels, but plant staff are unable to justify lower filtrate solids due to excessive chemical requirements.

Date Due

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BRANTFORD
OPERATING SUMMARY 1968

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RECOMMENDATIONS

Discussions begun this year on Proctor and Redfern's recommendations should be continued in 1969. These refer to modifications of aeration and return sludge equipment. A new project should be initiated as soon as possible to cover the cost.

Further exploration is required into the feasibility of a liquid sludge disposal program and discussions with municipal officials initiated in 1968 should continue in 1969.

No action on masonry deterioration on the digesters was taken during the past year. Action on this matter should again be considered for 1969.

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